

IN THE CLAIMS

1. (Currently Amended) A method for qualifying a semiconductor manufacturing tool comprising a bulk removal polishing platen, a copper clearing platen and a barrier removal polishing platen, said method comprising ~~the steps of~~:

- (a) transferring a wafer to said bulk removal polishing platen;
- (b) measuring, in situ, bulk removal polishing platen qualification characteristics from said wafer during processing by said bulk removal polishing platen;
- (c) qualifying said bulk removal polishing platen by adjusting one or more parameters of a process recipe in accordance with said one or more bulk removal polishing platen qualification characteristics measured from said wafer to target one or more bulk removal polishing platen specifications;
- (d) transferring a wafer to said copper clearing platen;
- (e) measuring, in situ, copper clearing platen qualification characteristics from said wafer during processing by said copper clearing platen;
- (f) qualifying said copper clearing platen by adjusting one or more parameters of said recipe revised in (c) in accordance with said one or more copper clearing platen qualification characteristics measured from said wafer to target one or more copper clearing platen specifications;
- (g) transferring a wafer to said barrier removal polishing platen;
- (h) measuring, in situ, barrier removal polishing platen qualification characteristics from said wafer during processing by said barrier removal polishing platen; ~~and~~
- (i) qualifying said barrier removal polishing platen by adjusting one or more parameters of said recipe revised in (f) in accordance with said one or more barrier removal

polishing platen qualification characteristics to target one or more barrier removal polishing platen specifications[[],]; and

(j) using said recipe revised in (i) in the processing of one or more subsequent wafers by ~~at least~~ each of said bulk removal polishing platen, said copper clearing platen, and said barrier removal polishing platen.

2. (Original) The method of claim 1, further comprising the steps of:

measuring, in situ, a defectivity from said wafer; and

qualifying said tool for detectivity by adjusting one or more parameters of said recipe in accordance with said defectivity to target a defectivity specification.

3. (Currently Amended) A method for qualifying a semiconductor manufacturing tool comprising a set of polishing and clearing platens, said method comprising ~~the steps of~~:

(a) processing a wafer with the set of platens of said manufacturing tool;

(b) measuring, in situ, from said wafer, during processing by each of the set of platens of said manufacturing tool, one or more qualification characteristics of each of the set of platens;

(c) after measuring qualification characteristics of one of the set of platens, qualifying the one of the set of platens of said manufacturing tool by adjusting one or more parameters of a process recipe in accordance with said one or more qualification characteristics measured from said wafer to target one or more ~~manufacturing tool~~ specifications of the one of the set of platens;

(d) repeating the adjustment of parameters of the recipe while qualifying each other of the set of platens, to provide a final recipe; and

(d) (e) using said final recipe in the processing of one or more subsequent wafers by each of the set of platens of said manufacturing tool.

4. (Original) The method of claim 3, wherein said manufacturing tool comprises a chemical planarization tool, which further comprises a bulk copper removal polishing platen, and wherein said one or more qualification parameters are measured during processing by said bulk copper removal polishing platen.

5. (Original) The method of claim 3, wherein said manufacturing tool comprises a chemical planarization tool, which further comprises a copper clearing platen, and wherein said one or more qualification parameters are measured during processing by said copper clearing platen.

6. (Original) The method of claim 3, wherein said manufacturing tool comprises a chemical planarization tool, which further comprises a barrier removal polishing platen, and wherein said one or more qualification parameters are measured during processing by said barrier removal polishing platen.

7. (Original) The method of claim 3, wherein said manufacturing tool comprises a chemical planarization tool, which further comprises a bulk copper removal polishing platen and a copper clearing platen, and wherein said one or more qualification parameters are measured during processing by said bulk copper removal polishing platen and said copper clearing platen.

8. (Original) The method of claim 3, wherein said manufacturing tool comprises a chemical planarization tool, which further comprises a copper clearing platen and a barrier removal polishing platen, and wherein said one or more qualification parameters are measured during processing by said copper clearing platen and said barrier removal polishing platen.
9. (Original) The method of claim 3, wherein said manufacturing tool comprises a chemical planarization tool, which further comprises a bulk copper removal polishing platen, a copper clearing platen, and a barrier removal polishing platen, and wherein said one or more qualification parameters are measured during processing by said bulk copper removal polishing platen, said copper clearing platen, and said barrier removal polishing platen.
10. (Original) The method of claim 3, wherein said measuring comprises measuring using an in situ eddy current measuring sensor implemented at a bulk removal polishing platen of said manufacturing tool.
11. (Original) The method of claim 3, wherein said measuring comprises measuring using an in situ laser interferometer implemented at a copper clearing platen of said manufacturing tool.
12. (Original) The method of claim 3, wherein said measuring comprises measuring using an in situ optical sensor implemented at a barrier removal polishing platen of said manufacturing tool.

13. (Original) The method of claim 3, where said one or more qualification characteristics comprises a polishing rate.
14. (Original) The method of claim 3, where said one or more qualification characteristics comprises a nonuniformity.
15. (Original) The method of claim 3, where said one or more qualification characteristics comprises a defectivity.
16. (Original) The method of claim 3, wherein said wafer comprises a single patterned wafer.
17. (Original) The method of claim 16, wherein all of said one or more qualification characteristics required to properly qualify said tool are measured from said single patterned wafer.
18. (Original) The method of claim 3, wherein said tool is properly qualified using qualification characteristics measured only from said wafer.
19. (Currently Amended) A semiconductor manufacturing tool including a set of polishing and clearing platens, the tool comprising:
a processing module at each of the set of platens capable of processing a wafer;

an in situ metrology device at each of the set of platens capable of measuring from said wafer, during processing by each of the set of platens, one or more qualification characteristics of each of the set of platens; and

a controller at each of the set of platens capable of qualifying said each of the set of platens ~~manufacturing tool~~ by adjusting one or more parameters of a process recipe in accordance with said one or more qualification characteristics measured from said wafer to target one or more ~~manufacturing tool~~ specifications of corresponding platens, wherein ~~said~~ a resulting recipe is used in the processing of one or more subsequent wafers by each of the set of platens of said manufacturing tool.

20. (Original) The tool of claim 19, wherein said manufacturing tool comprises a chemical planarization tool, wherein said processing module comprises a bulk copper removal polishing platen, and wherein said one or more qualification parameters are measured during processing by said bulk copper removal polishing platen.

21. (Original) The tool of claim 19, wherein said manufacturing tool comprises a chemical planarization tool, wherein said processing module comprises a copper clearing platen, and wherein said one or more qualification parameters are measured during processing by said copper clearing platen.

22. (Original) The tool of claim 19, wherein said manufacturing tool comprises a chemical planarization tool, wherein said processing module comprises a barrier removal polishing platen, and wherein said one or more qualification parameters are measured during processing by said barrier removal polishing platen.

23. (Original) The tool of claim 19, wherein said in situ metrology device comprises an in situ eddy current measuring sensor implemented at a bulk removal polishing platen of said manufacturing tool.

24. (Original) The tool of claim 19, wherein said in situ metrology device comprises an in situ laser interferometer implemented at a copper clearing platen of said manufacturing tool.

25. (Original) The tool of claim 19, wherein said in situ metrology device comprises an in situ optical sensor implemented at a barrier removal polishing platen of said manufacturing tool.

26. (Original) The tool of claim 19, where said one or more qualification characteristics comprises a polishing rate.

27. (Original) The tool of claim 19, where said one or more qualification characteristics comprises a nonuniformity.

28. (Original) The tool of claim 19, where said one or more qualification characteristics comprises a defectivity.

29. (Currently Amended) A system for qualifying a semiconductor manufacturing tool comprising a set of polishing and clearing platens, said system comprising:

means for processing a wafer with the set of platens of said manufacturing tool;

means for measuring, in situ, from said wafer, during processing by each of the set of platens of said manufacturing tool, one or more qualification characteristics of each of the set of platens; and

means for, after measuring qualification characteristics of one of the set of platens, qualifying the one of the set of platens of said manufacturing tool by adjusting one or more parameters of a process recipe in accordance with said one or more qualification characteristics measured from said wafer to target one or more ~~manufacturing tool~~ specifications of the one of the set of platens; and

means for repeating the adjustment of parameters of the recipe while qualifying each other of the set of platens, to provide a final recipe, wherein said final recipe is used in the processing of one or more subsequent wafers by each of the set of platens of said manufacturing tool.

30. (Original) The system of claim 29, wherein said means for measuring comprises means for measuring using an in situ eddy current measuring sensor implemented at a bulk removal polishing platen of said manufacturing tool.

31. (Original) The system of claim 29, wherein said means for measuring comprises means for measuring using an in situ laser interferometer implemented at a copper clearing platen of said manufacturing tool.

32. (Original) The system of claim 29, wherein said means for measuring comprises means for measuring using an in situ optical sensor implemented at a barrier removal polishing platen of said manufacturing tool.

33. (Original) The system of claim 29, where said one or more qualification characteristics comprises a polishing rate.

34. (Original) The system of claim 29, where said one or more qualification characteristics comprises a nonuniformity.

35. (Original) The system of claim 29, where said one or more qualification characteristics comprises a defectivity.

36. (Currently Amended) A computer readable medium for qualifying a semiconductor manufacturing tool comprising a set of polishing and clearing platens, said computer readable medium comprising:

computer readable instructions for processing a wafer with the set of platens of said manufacturing tool;

computer readable instructions for measuring, in situ, from said wafer, during processing by each of the set of platens of said manufacturing tool, one or more qualification characteristics of each of the set of platens; and

computer readable instructions for, after measuring qualification characteristics of one of the set of platens, qualifying the one of the set of platens of said manufacturing tool by adjusting one or more parameters of a process recipe in accordance with said one or more qualification characteristics measured from said wafer to target one or more ~~manufacturing tool~~ specifications of the one of the set of platens; and

computer readable instructions for repeating the adjustment of parameters of the recipe while qualifying each other of the set of platens, to provide a final recipe, wherein said final recipe is used in the processing of one or more subsequent wafers by each of the set of platens of said manufacturing tool.

37. (Original) The computer readable medium of claim 36, wherein said computer readable instructions for measuring comprises computer readable instructions for measuring using an in situ eddy current measuring sensor implemented at a bulk removal polishing platen of said manufacturing tool.

38. (Original) The computer readable medium of claim 36, wherein said computer readable instructions for measuring comprises computer readable instructions for measuring using an in situ laser interferometer implemented at a copper clearing platen of said manufacturing tool.

39. (Original) The computer readable medium of claim 36, wherein said computer readable instructions for measuring comprises computer readable instructions for measuring using an in situ optical sensor implemented at a barrier removal polishing platen of said manufacturing tool.

40. (Original) The computer readable medium of claim 36, where said one or more qualification characteristics comprises a polishing rate.

41. (Original) The computer readable medium of claim 36, where said one or more qualification characteristics comprises a nonuniformity.

42. (Original) The computer readable medium of claim 36, where said one or more qualification characteristics comprises a defectivity.

43. (Previously Presented) The method of claim 1,
wherein said bulk removal polishing platen is qualified by adjusting one or more parameters of a first recipe;
wherein said copper clearing platen is qualified by adjusting one or more parameters of a second recipe;
wherein said barrier removal polishing platen, is qualified by adjusting one or more parameters of a third recipe; and
wherein said first, second, and third recipes are distinct.

44. (Previously Presented) The method of claim 1, wherein steps (a)-(j) are performed periodically.